M. C. KESSLER.

EXPLOSIVE ENGINE.

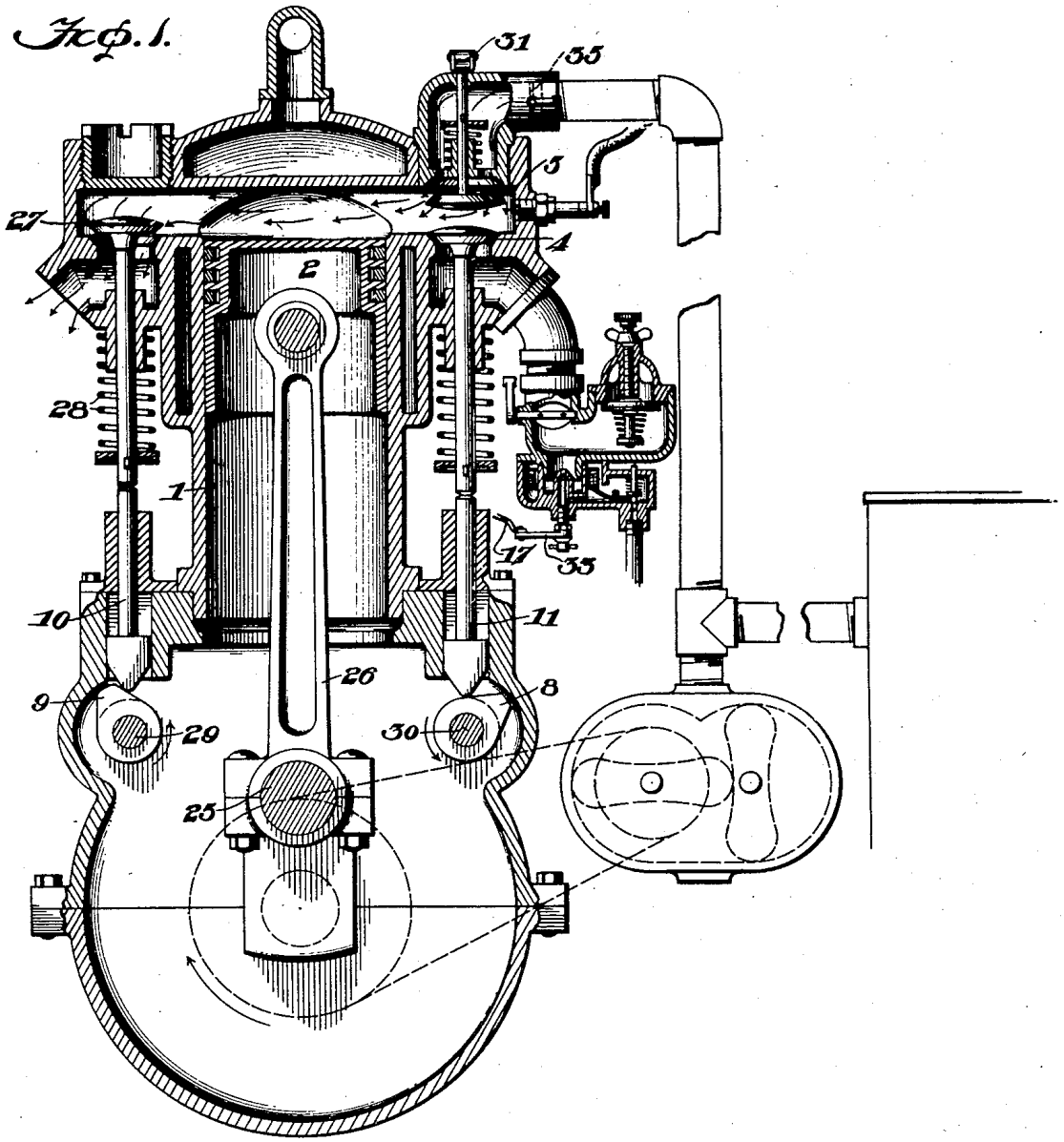
APPLICATION FILED APR. 16, 1908. RENEWED JAN. 21, 1913.

1,070,139.

Patented Aug. 12, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

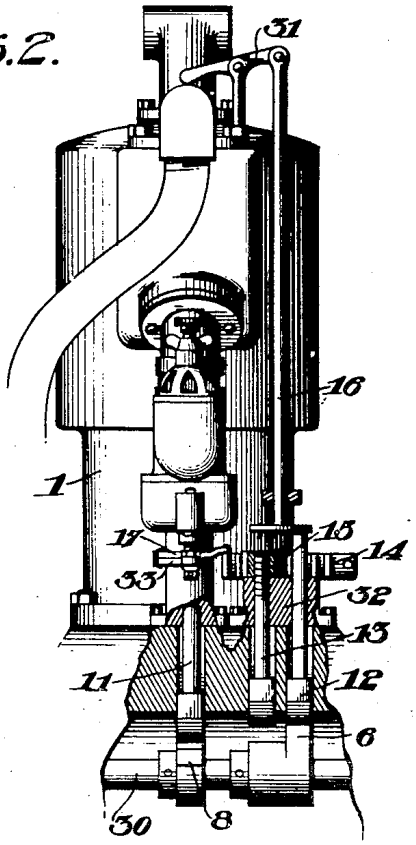


Fig. 3.

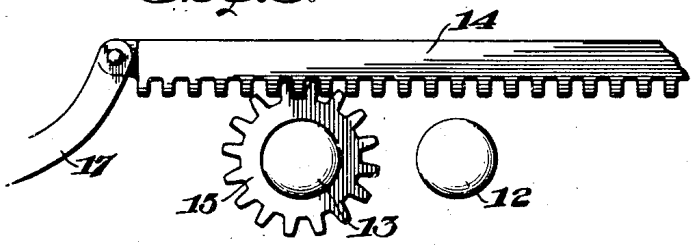
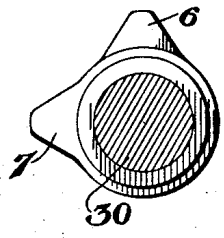


Fig. 4.



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UNITED STATES PATENT OFFICE.

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EXPLOSIVE-ENGINE.

1,070,139. Specification of Letters Patent. Patented Aug. 12, 1913.

Application filed April 16, 1908, Serial No. 427,422. Renewed January 21, 1913. Serial No. 743,419.

To all whom it may concern:

Be it known that I, MARTIN C. KESSLER, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification.

My invention relates to an improvement in explosive engines, and more particularly to means for scavenging and augmenting in four-cycle internal combustion engines.

In my Patent No. 867,279, of October 1, 1907, a system of air compression and control was set forth whereby the crank case or equivalent compression chamber of the engine, was utilized to receive a charge of air which was compressed therein by the instroke of the piston and liberated by the piston at the conclusion of each alternate instroke for scavenging the entire cubic area of the cylinder, and the air compressed in the crank case by the remaining instrokes was controllable by suitable valve mechanism for augmenting and increasing the explosive charge initiatory to the immediately succeeding explosion. In all explosive engines of this type, there remains a clearance space between the outer end of the piston and the corresponding end of the cylinder at the termination of the outstroke of the piston, and as the piston itself displaces all but this limited area in the cylinder, the most complete and effectual scavenging of exhaust charge can be accomplished by merely sweeping the gases from this clearance space during the momentary interval of time that the piston remains at this extreme position of its outstroke, as contra-distinguished from sweeping the entire cylinder. Furthermore, and of no less importance is the fact that with this limited clearance space to be swept, a correspondingly less amount of air is required to expel the exhaust, it requiring less time to accomplish it, and the result is a perfect ventilation and consequently a much smaller air compression means is required than otherwise to accomplish the required results.

This brings me to the object of my present invention which is to provide a simple and economical means of increasing the power, efficiency, and cooling of four-cycle internal combustion engines by using a compression means such as a pressure blower for instance, to scavenge the products of combustion from the clearance space of the cylinder which is not occupied by the piston approximately at the end of the exhaust stroke.

A further object is to provide controllable means for augmenting or increasing the normal intake volume by supplying air from said compression means approximately at the end of the intake stroke.

With these objects in view, my invention consists in certain novel features of construction and combinations of parts which will be hereinafter described and pointed out in the claims.

In the accompanying drawings:—Figure 1 is a vertical section through my improved engine. Fig. 2 is an elevation at right angles to the view shown in Fig. 1, the parts broken away. Figs. 3 and 4 are details.

In the drawings, the numeral 1 represents the cylinder, and 2 is a piston connected to the crank pin 25 by the connecting rod 26 in the usual manner. The exhaust from the clearance space of the combustion chamber is controlled by the exhaust valve 27, which valve is normally seated by the spring 28, and this valve is opened at predetermined intervals by the cam 9 on shaft 29, striking the lower V-shaped end of the push rod 10. The intake valve 4 is preferably of similar construction, and similarly operated by a push rod 11 through a cam 8 on the shaft 30. These two shafts 29 and 30 turn at the same speed in the same direction as indicated by the arrows, they being actuated through gear wheels, (not shown) from a pinion on the main crank shaft 25.

Air from the blower 18 is discharged through a port controlled by a valve 5, and valve 5 may be operated in any approved manner, as for instance through the rod 16 and the lever 31, which latter unseats valve 5 when the rod 16 is raised. This valve 5 is invariably open at the conclusion of each outstroke of the piston following an explosion, and as a result the combustion space is instantaneously swept of the burnt gases at the moment its minimum area and capacity is reached, thereby resulting in an economical expenditure of air, and a rapid and effectual sweeping of the combustion or clearance space of the cylinder. At these regular intervals, approximately at the conclusion of the alternate outward strokes of the piston, the valve 5 is unseated by the push rod 12 engaging the head on the lower end of

the rod 16 through the medium of the cam 6 on the shaft 30.

In addition to the scavenging of the engine, the valve 5 of my present invention is controllable for augmenting the supply of air to the cylinder, and the valve is rendered controllable at these periods by any approved method for this purpose. Of many which might be adopted, I have illustrated but one means to accomplish this, and it consists of a push rod 13 beneath the head on the lower end of rod 16 with its lower end in the path of the cam 7 on the shaft 30. The upper end of this push rod 13 is screw-threaded and an internally screw-threaded pinion 15 is mounted thereon and confined at the top of the guide-way 32. The teeth of this pinion 15 are engaged by a slidable rack 14 which rack is within the control of the operator to move back and forth as occasion requires, that is to say, when more or less air is to be admitted for augmenting purposes. As more air is injected, a greater supply of fuel is desirable, and consequently the link 17 is provided. This extends from the rack 14 to a lever 33 on the needle valve of the carbureter so that as more air is admitted, the needle is correspondingly opened, and vice versa.

So far as the various expedients are concerned for carrying out the idea of this invention, it is not my intention to limit myself to any particular form of valve or valve controlling mechanism, the main idea being the control and discharge of the air from a compression source at the period of minimum capacity of the combustion or clearance space for scavenging purposes for prompt and effectual sweeping of this space as well as economy in the use of compressed air for accomplishing the clearing out of this space, and furthermore, the use of a supply of this air from the same source for increasing the charge, it being understood that the drawings are merely an illustration of one of a number of possible mechanisms for carrying out the idea of this invention. In other words, in my present engine, I therefore propose to introduce air from said compression means through a valve suitably located in the combustion chamber and operated to blow out the burnt gases and to be controlled at will to augment the normal charge.

In operation, it will be readily seen by reference to Fig. 1, that the exhaust valve 3 is still open and that fresh air from the blower is blowing through the port controlled by valve 5, and sweeping the combustion chamber of its burnt gases and leaving the chamber full of pure air. Then as piston 2 moves downwardly, on the intake stroke, the valve 5 is closed, and the intake valve 4 is opened, and the engine receives its normal charge, and is controlled by the throttle according to the power desired until the throttle has reached its greatest opening. Then the rack 14 is shifted which rotates pinion 15, and lengthens push rod 13 that it may come in contact with cam 7 on shaft 30 which operates at approximately the end of the intake stroke, and in this way rod 16 operates valve 5, and an extra volume of air is forced into the cylinder, said volume being controlled according to the length of rod 13, and while this is being done, the means is operated for maintaining the proper mixture by rod 17 which is connected to rack 14 as well as to the needle valve of the carbureter or mixing device. The air from the blower may be cut off by turning the butterfly valve 35.

Various more or less slight changes might be resorted to as I have hitherto indicated, without departure from the spirit and scope of my invention, and hence I do not wish to limit myself to the exact construction herein set forth, but:—

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an explosive engine, ordinary means for introducing air and adjustable means for introducing air under pressure into the cylinder at the explosion end approximately at the termination of the intake stroke to augment the normal intake charge, and means for introducing air into the cylinder approximately at the end of the exhaust stroke to scavenge or sweep out the remaining burnt gases.

2. In an explosive engine, means for introducing air under pressure into the cylinder at the explosion end approximately at the termination of the intake stroke to augment and in addition to the normal intake charge, and means for introducing air into the cylinder from the same source approximately at the end of the exhaust stroke to scavenge or sweep out the remaining burnt gases.

In testimony whereof I affix my signature in presence of two witnesses.

MARTIN C. KESSLER.

Witnesses:
LOUISE L. KESSLER,
H. C. BROOKS, Jr.